

ARI Research Note 96-57

Managerial and Organizational Determinants of Efficiency in Research Teams (Social Sciences)

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March 1996

19960829 107



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REPORT DOCUMENTATION PAGE

1. REPORT DATE 1996, March		2. REPORT TYPE Final		3. DATES COVERED (from... to) June 1981-June 1982	
4. TITLE AND SUBTITLE Managerial and Organizational Determinants of Efficiency in Research Teams (Social Sciences)				5a. CONTRACT OR GRANT NUMBER DAJA-37-81-C-0286	
				5b. PROGRAM ELEMENT NUMBER 0601102A	
6. AUTHOR(S) Claude Levy-Leboyer (Universite Rene Descartes)				5c. PROJECT NUMBER B74F	
				5d. TASK NUMBER 1207	
				5e. WORK UNIT NUMBER C14	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) UER Institut de Psychologie Universite Rene Descartes 28, Rus Serpente Paris, France				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: PERI-BR 5001 Eisenhower Avenue Alexandria, VA 22333-5600				10. MONITOR ACRONYM ARI	
				11. MONITOR REPORT NUMBER Research Note 96-57	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES COR: Michael Drillings					
14. ABSTRACT (Maximum 200 words): This research explores the generalizability of the conclusions reached in a previous survey on biomedical research. Various possibilities for a success index in social sciences are discussed. The diversity of the heuristic processes in the social sciences are described as well as the variety of leadership styles.					
15. SUBJECT TERMS Success index Research Management Leadership Social climate Creativity					
SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT Unlimited	20. NUMBER OF PAGES 74	21. RESPONSIBLE PERSON (Name and Telephone Number)
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified			

MANAGERIAL AND ORGANIZATIONAL DETERMINANTS
OF EFFICIENCY IN RESEARCH TEAMS (SOCIAL SCIENCES)
FINAL REPORT (AUGUST 1982)

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JULY 1982

Prepared under contract Number : DAJA 37 81 C 0286
for

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for the BEHAVIORAL and SOCIAL SCIENCES
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Alexandria, Virginia 22333 U.S.A.

The research reported in this document has been made possible by Contract number : DA JA 38 81 C 0286 from the U.S. Army Research Institute of the Behavioral and Social Sciences through its European Liaison Office at the European Research Office of the U.S. Army, London, England. The opinions expressed are those of the author and do not necessarily represent those of the U.S. Army.

MANAGERIAL AND ORGANIZATIONAL DETERMINANTS
OF EFFICIENCY IN RESEARCH TEAMS (SOCIAL SCIENCES)

FINAL REPORT

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I - PURPOSE OF THE RESEARCH

A first "research on research" now published in French and in press in a collective volume in English sponsored previously by ARI came out with conclusions on the relationship between the institutional environment and the leader behavior, on one hand, the leader behavior and the team productivity on another hand which did not follow the classical contingency model. Moreover interpretation of the data lead us to propose that the heuristic process plays a moderator role on the causal relationship between leader behavior and worker productivity.

This last remark if supported by further research, could have far reaching consequences as, in practical terms, it would mean that teams leader should adopt different styles according to the heuristic process of their own field of research and, more specifically, the social aspects of research imposed by the dynamics of discovery in the field (interdisciplinary or monodisciplinary, solitary or group research, empirically or theoretically based experimental planning).

One way to go on experimenting on these hypothesis was to try the applicability of the model to another field of research, preferably a field where intra comparison of different heuristic process could be possible. Social sciences was proposed and ARI accepted to sponsor another "research on research".

The present report will describe the development of the survey with head of laboratories as well as the search for a criteria of productivity. The survey itself was much less easy than the first one, -instead of a very small percentage not willing to answer our questions, we reach here between 1/5 and 1/3 according to the different fields. It must be said that the survey had to be in operation while preparation for a national colloquium on research, organized by the Ministry of research and technology, was keeping busy filling questionnaires and discussing research management and orientation, most

of the members of our sample. What was a new line of thought for the subjects of our first research appears like a much repeated debate in the present case.

Moreover, as will be explained in part III, the building of productivity criteria, or a success index met with such difficulty in the social sciences that one wonders on which basis are decisions actually taken by funding committees and research agencies.

We have therefore organized the results in two parts : (1) report of the survey itself ; (2) effort to build criteria. These will be followed by a general conclusion on research evaluation in different fields and the need to implement job analysis design of research activities.

II - THE SURVEY

1 - ECONOMY -

A) The organizational conditions

- A.1 Affiliation
- A.2 Teams' size
- A.3 Researchers training
- A.4 Researchers age
- A.5 Membership sex
- A.6 The teams' seniority

B) The heuristic process

- B.1 Mathematical economy
- B.2 Economic research
- B.3 Economic research applied to non-economic fields

C) Research characteristics

- C.1 Mono or pluri-disciplinary research
- C.2 Individual or group research
- C.3 Basic research or grant research
- C.4 Given data or built data

D) The teams management

- D.1 Meetings' frequency
- D.2 Are researchers controlled ?
- D.3 Competition between researchers

E) Team's productivity

2 - LINGUISTIC -

A) The organizational conditions

- A.1 Affiliation
- A.2 Teams' size
- A.3 Researchers training

- A.4 Researchers age
- A.5 Membership sex
- A.6 The teams' seniority

- B) The heuristic process
 - B.1. Ethnolinguistic
 - B.2 The theoretical linguistic

- C)
 - C.1 Mono or pluri-disciplinary research
 - C.2 Individual or group research
 - C.3 Basic research or grant research
 - C.4 Given data or built data

- D) The teams management
 - D.1 Meetings frequency
 - D.2 Are researchers controlled ?
 - D.3 Competition

- E) Teams' productivity

3 - ETHNOLOGY -

- A) The organizational conditions
 - A.1 Affiliation
 - A.2 Teams' size
 - A.3 Researcher's training
 - A.4 Researcher's age
 - A.5 Membership sex
 - A.6 The teams' seniority

- B) The heuristic process

C) Research characteristics

- C.1 Mono or pluri-disciplinary research
- C.2 Individual or group research
- C.3 Basic research or grant research
- C.4 Given data or built data

D) The teams' management

- D.1 Meetings frequency
- D.2 Are researchers controlled ?
- D.3 Competition

E) The teams' productivity

111 THE CRITERION PROBLEMS

The present report deals with three research domains : economy, linguistic and ethnology. Two public research organizations have been surveyed : C.N.R.S. (Centre National de la Recherche Scientifique), E.H.E.S.S. (Ecole des Hautes Etudes en Sciences Sociales), and two public Institutes in which research is not the only activity, INED (Institut National des Etudes Démographiques) and I.N.S.E.E. (Institut National de la Statistique et des Etudes Economiques). Actually, more organizations are included in this sample since teams have often several affiliations : Universities, Museums of France, College de France. Fifty two research teams have accepted to answer our questions ; however, eighteen refused with various excuses and seven more were impossible to reach because they were outside France at the time of the survey and for a long period.

All the research teams surveyed are located in Paris or the center of the country ; twenty interviews were done by ^{phone} and thirty are face-to-face interviews. The methodology used in the research carried out in bio-medical research teams has been applied : first, a letter is sent to each head of a research team ; the letter explains the research purposes and asks for cooperation. An appointment (phone or face to face) is asked for in the following week, -subjects being left free to choose the type of interview they preferred. The interviews last from thirty minutes to two hours (the mean time being seventy minutes).

Among the fifty one research teams surveyed, 22 belong to Economy, 16 to Ethnology and 13 to Linguistic. These three domains of research have been chosen for the survey because they allow us to test the following hypothesis :

(1) Research teams with different scientific approach and different heuristic process have different styles of leadership.

(2) These different fields of research are not equally related to social events. For instance, Economy is very involved in contemporary problems. This could have an influence on the style of research and bring an incentive for competition and for productivity. Ethnology has another type of social value, as an effort to understand different cultures and ways of living. Linguistic is more distant from all kinds of social concerns, except when applied to the protection of ~~threaten~~ languages or to ~~education~~.

(3) The different human composition of each research team should influence the style of leadership as well as the content of research. For instances, young researchers need to be trained through the different stages of research while mature researchers are likely to do long-term research by themselves, with less support from the group.

This chapter will include four sub-chapters : the first one deals with Economy, the second one with Linguistic, the third one with Ethnology, the fourth one will summarize results, propose and discuss some comparisons. For each field of research four aspects will be described : the organizational conditions, the scientific process, the type of research carried out by the team and the team's management.

The methodology of the interview is exactly the same as the one described in our preceding report on research in the bio-medical field. Some questions have been rewritten to ~~fit~~ the nature of the fields. A list of the research teams surveyed as well as the interview guideline is given in annex.

CHAPTER I - ECONOMY

Twenty two research teams have been surveyed, seven by telephone and 15 by face-to-face interview. Let us remind the reader that 47 research teams in economy located in the whole country belong to C.N.R.S. : 34 are "associated research teams", (ERA, équipe de recherche associée), 7 are "research teams" (ER, équipe de recherche), 4 are "associated laboratories" (LA, Laboratoires associés), and 2 are "own laboratories" (LP, laboratoires propres). It means that 72 % of the research teams in Economy have a four-years contract with C.N.R.S., at the end of which they are rated by a committee which decides whether they will be granted again or not. It is not easy to become an ERA, but once a team reaches this point, it usually keeps for a long while the support of the C.N.R.S.

A - THE ORGANIZATIONAL CONDITIONS -

A.1 - Affiliation -

Among the 23 research teams surveyed, 15 are ERA, 5 are ER, and 2 belong to other national organizations : I.N.S.E.E. (National Institute for Statistics and Economic Studies) and I.N.E.D. (National Institute for Demographic Studies). The research team which belongs to I.N.S.E.E. has a particular position : this is the only one to do this type of research inside I.N.S.E.E. and people coming from other departments may join it for two or three years if their research project has been accepted. So some of the researchers are not permanent. The research team which belongs to I.N.E.D. is affiliated to a larger research department and its researchers are permanent.

Most of the research teams have strong links with Universities : 13 ERA are run by a professor, and among these, 10 are located in University buildings. Three are located in other national research organizations such as C.E.P.R.E.M.A.P. (Center for Research and application in applied economy) and C.R.E.D.O.C. (Center for Research and Information on Consumption). Two ERA which have a double affiliation (C.N.R.S. and E.H.E.S.S.) are managed by "Directors of studies" (the highest teaching position in E.H.E.S.S.) and located in E.H.E.S.S. buildings. Among the five ER, two are located in University buildings while managed by high level C.N.R.S. researchers and the others are located in Ecole Polytechnique, C.E.R.E.B.E. (Center for Research on well-being) and Foundation for Political Sciences, -each being conducted by top level C.N.R.S. researchers.

This description shows that all the research teams (except two) are related to teaching activities through their leader and are open to students. This remark is very important for team's development as further results will show it. Table 1 summarizes this description :

N = 12	N = 2	N = 6	N = 2
C.N.R.S.	C.N.R.S.	C.N.R.S.	National Research
+ University	+ E.H.E.S.S.	+ other res. organizations	Organization
↓	↓	↓	↓
Professors (10) ;	Director of	Professors (3)	Top level civil
top level researchers	Studies	Top level researchers	servant
(2)		(3)	

In order to rate the research team's size, we have taken into account the different positions of members : researchers, teaching-research persons (professors, and other positions of University teachers) technicians, and staff. So foreign researchers who stay in the research team for a limited period

and outside co-researchers involved in the team's activities but not in a regular way have not been counted. Five research teams have less than five people, nine have between six and ten people and eight have between eleven and twenty - So fourteen research teams have less than ten people.

Seven research teams do not have any C.N.R.S. researcher. There are several reasons to this fact : the research teams which belong to I.N.S.E.E. and I.N.E.D. have their "own" researchers ; two research teams have C.N.R.S. researchers who eventually reached a Professor's position ; and E.H.E.S.S. team has only E.H.E.S.S. researchers ; two research teams have been ERA for less than four years and one of them has only C.N.R.S. technicians.

Four research teams do not have any C.N.R.S. ITA ("Ingenieurs", Technicians, administrative staff) but they have at least one part-time secretary related to University or to the organization where the team is located. In addition, in half of the surveyed research teams, there is no difference between researcher and ITA ; in other words ITA do research as well as researchers. In the C.N.R.S. it is easier to get an ITA position than a researcher position, so a lot of young researchers enter C.N.R.S. through this door.

All the research teams except one are involved in teaching activities, either the head of the team, or the researchers. Some remarks have to be done about foreign researchers : most of the time they are professors who have a grant with the University for one year in order to get in touch with the different research teams in the University. Some foreign researchers may also have a research grant from a national

organization such as CEPREMAP, CREDOC and so forth -in which the research team is located. So the team is likely to receive foreign researchers for one or two months. But very few teams receive for a long time foreign senior researchers : actually among the teams surveyed, two had more than one foreign researcher for one year ; both of them are large teams between 15 and 20 people and are directed by professors who are more than 50 years old. Other research teams have foreign students who get a scholarship from their country to complete a "doctorat".

To summarize, research teams in economy are small, involved in teaching activities and physically very closed to one another inside each organization. For instance in the University of Nanterre - Paris X, all the research teams in economy are located on the same floor and there is a federation led by a professor which gathers all the 8 existing research teams and stands for them in the University Council. In the University of Dauphine and Paris I - Tolbiac the research teams in economy are also located on the same floor. As to the others, they are located in the organization's buildings to which they belong, C.E.P.R.E.M.A.P., C.R.E.D.O.C., where only full-time researchers are to be found. These means that among teams located in Universities relationships are very frequent and information about the researches carried out is widely circulated.

A.3. Researchers training.-

Eight research teams have researchers who graduated at University, six have researchers who graduated either at University or in Grandes Ecoles, six have researchers who graduated at both University and Grandes Ecoles, two have researchers who just graduated at Grandes Ecoles. So the training

given in the Grandes Ecoles is important and we will have to check the impact of this factor on research teams efficiency, since in bio-medical field it appeared to be a success factor.

A.4. - Researcher's age -

Three age patterns can be described :

(1) In 14 research teams, researchers and head of laboratory have about the same age (between 35 and 45 years old). Among these, one research team has both its researchers and its head under 35 and three research teams have researchers and head between 40 and 45. In one case, the head is slightly younger (35) than his researchers (35 - 40).

(2) Four research teams have researchers who are between 28 and 35 years with the head of the laboratory being 45-50 years old.

(3) In four teams the difference between researcher's age and head's age is large : researchers are about 35 years old and head over 55 years old.

So generally research teams are young even if we do not find ~~beginners~~ in research, which is due to the last years cuts in hiring researchers.

A.5. - Membership sex -

Among 22 heads of laboratory, 3 are women (two are professors, one is a C.N.R.S. senior researcher). Four research teams do not have any female researcher ; only one head of laboratory said he preferred to work with male researchers because women are too often on maternity leaves.

1.6. - The teams' seniority -

Seven research teams have existed for more than 10 years, including the teams belonging to INED and INSEE which are 15 years old.

15 research teams have existed for ten years and less, including three who are less than five years old. It is expected that team's length will have an impact on its productivity. But we will have to pay attention to the team's history because some of them improve their success as they get older while others see their productivity decreases.

B - THE HEURISTIC PROCESS -

Three types of scientific approaches characterise the economic research :

- (1) Mathematical economy and econometry,
- (2) Economic research which basically uses statistic,
- (3) Economic research which uses both existing data and their own data, out of the surveys they organize themselves.

B.1. - Mathematical economy -

Mathematics in economic research are used to express economic data in mathematical formula ; for instance models of the economic impact of under-employment. So research teams specialized in econometry have two purposes :

- 1) - to translate economic topics in mathematical language,
- 2) - to build specific statistical methods able to analyse new data. But they do not use these methods, they just build them. One of these teams is expert in theory of systems and theory of games, which is the mathematics of decision. So these teams do basic research in mathematical economy and their researchers are expert mathematicians.

B.2. - Economic research -

Research teams included in this group do basic research in order to analyze and understand economic events. They try to build models which are used for the study of economic data. For instance, in order to study intergenerational wealth transfer, a model will be built, then tested with given data. So basic research is either applied to actual events or used to forecast them. Sometimes they use existing models that they have to adjust. Another example is applied macro-economic analysis, such as econometric modelization of French economy development.

These research teams focus both on theory and applied research. Most of them have at least one mathematician and always several very well trained statisticians.

B.3. - Economic research applied to non-economic fields -

Modern economic analysis is applied to non-economic fields such as education, social policy, family. Test of different paradigms is used to improve theory or to refute it. Very few economy research teams do surveys by themselves ; usually they use given data. Sometimes some of them do large-scale questionnaires surveys, but these are very expensive and cannot be frequent. Difference between economic research B2 and B3 is to be found at the level of application ; in B2, theoretical models are applied to economical data which are also used to build or adjust new models ; in B3 research is applied to non-economic fields.

There is a very important common feature to the three types of scientific approaches: all of them start with a theoretical hypothesis or theoretical concepts, and (except for mathematical economy which only does basic research), the

other approaches are always based on theory and set a symmetrical relation between theory and data. To summarize, economic research is focused on mathematical translation of economic events, setting and testing basic models and working out forecasting models.

C - RESEARCH CHARACTERISTICS -

C.1. - Mono_or_pluri-disciplinary_research -

Among the twenty two research teams surveyed, ten have at least one mathematician and twelve have none. Moreover, seven have among ^{their} staff researchers whose basic training is neither economy, nor mathematics, but training in other fields like history or social sciences. So it can be said that fifteen research teams are monodisciplinary, in the sense that they have both economists and mathematicians.

It must be added that researchers with a basic training in sociology belonging to economic research teams have some academic problems in C.N.R.S. because they are rated by the sociology section while their team is rated by the economy section. As a matter of fact, until now, C.N.R.S. did not approve the teams that have researchers depending on another section than theirs. So it explains why there are so few pluridisciplinary research teams. To describe the situation in simpler words : the institution itself is against interdisciplinary , -even if its productive value has not been tested.

C.2. - Individual_or_group_research -

Most of the researchers work alone. They normally have a personal research project which is within the scientific field of the team. Group research do exist but usually it means

that two people work on one project. Individualistic research has been fostered by C.N.R.S. which gives more value to publications with only one name for researchers advancement. Group publications might be a collective book in which each chapter is written by a different person. This policy does not develop, of course, group works.

Many heads of laboratory do not approve this research policy. They say that the requirement of researchers careers are opposed to group research, and destroy the life of the research team. Moreover they emphasis the fact that they have no authority on researchers who work alone and are rated by an outside committee. If the teams head do not agree with the methodology used by researchers, there is nothing he can do. So it happens often that researchers inside the same team use quite different methodologies ; even the researchers' purposes may not coincide with the team's purposes ; and in order to have career advancement researchers try to write as many papers as possible.

We shall return to this point later. But we wish to underline here the environment influence on the quality of the authority given to the head of the laboratory. In the bio-medical field, where access to equipment and use of the technical staff is a key factor the head has power because he allocates equipment and staff. In economy where solitary research with very often nothing but paper and pencil is needed, the head has ~~no~~ authority, -except charismatic- because he has nothing to give to or take back from the researchers.

C.3. Basic research or grant research -

Most of the research teams in economy ^{are} very often offered grant research by State Departments, Public Administrations and

Private Companies. Most of them refuse the short-term grants (6 months or one-year) unless it allows a graduate student to support himself for a while. But research teams are not equally offered to do research : some of them who do research on present events such as unemployment, savings behaviour, women's work, or who work on forecasts are more often asked to do applied research.

Generally speaking there is a controversial issue about grant research. On the one hand grants are expected to widen the research topics of the team and therefore to scatter their activities ; on the other hand with grants, it is compulsory for researchers to work within deadline which is very important in economy because competition is hard and one has to work quickly.

C.4. - Given data or built data -

Data used by economists researchers are usually gathered by specialized organizations such as INSEE (Institut National de la Statistique et des Etudes Economiques) or INED or state Department such as Ministère du Plan, Ministère du Travail and so forth. Very few teams do surveys which are too expensive. They prefer to borrow raw data and adapt them to their own research purposes.

In conclusion, most of the research teams in economy have mathematicians and economist researchers, very few have researchers with different trainings. The research is more often individual than group-work ; however, as teams are small, even if researchers do not really work together, they know what research is carried out inside the team and outside in the neighbour teams. Finally researchers in economy do not gather data by themselves but use official data compiled by expert organizations.

D - THE TEAMS' MANAGEMENT -

D.1. - Meeting's frequency -

Eight research teams do not have any regular meetings and meet only if they have a special motive such as define a program every term, plan a report on the research in progress or even have a scientific discussion about an important paper.

Four teams have one regular meeting every month ; four teams have one meeting every week and in this case they are more often staff meeting than scientific one. And two teams have seminars open to graduate students who complete a thesis with the head of laboratory or with other people from the University who do research on the same subject.

It must be added that the present situation is the result of experience. A lot of teams gave up the weekly meeting because they feel it was a waste of time. Among the 4 teams with weekly meetings, two of them make it a non-compulsory meetings which researchers attend only if they need it or want it.

So generally formal meetings are not very usual in economy. But let us remind that teams are small, and located in University of E.H.E.S.S. or still in other National Research Organizations, among other research teams. So information run fast from one team to another ; moreover there are many experts' conferences which gather all the research teams in economy working on a specific topic so everybody knows everybody.

D.2. - Are researchers controlled?

We almost already answered this question. For researchers who have a C.N.R.S. position, whatever their experience, there is no control from the Head of the team. But researchers are required to write a report for C.N.R.S. about their work every year. For teams which gather only professors and high-level researchers, the Head of the team has only an administrator role ; he has not and does not want to have any scientific authority. Finally there is control from the Head of the team just over graduate students who are doing their dissertation with him, while working on grants inside the team. So researchers after they have a C.N.R.S. or a University position are independant from the Head of the team to which they belong.

D.3. - Competition -

There are two kinds of competition within the economy research teams. First, institutional : several researchers who belong to the same research team apply for a C.N.R.S. position of for a promotion to a higher position. So the organization puts them in competition. Second, international competition, which makes competition inside the team, sharper. Whatever the type of competition, it stresses the individual character of research. Generally, heads of team prefers to speak of emulation inside the team rather than competition saying that since each researcher has his own research subject which is different from every other one, it is not possible to give relative evaluation.

The main feature of research teams' management in economy seems to be the absence of strong leadership which may be explained by the low mean age of teams heads, by the fact that the researchers and the head of teams have often reached the same scientific level. The grant opportunities and competition

outside the team are the real incentives for research which is developed in a very flexible organizational structure. The organizational power of the head of the laboratory is weak, -as well as his real responsibility for researchers' efficiency.

E - TEAM'S PRODUCTIVITY -

Three productivity criteria can be used : publications (articles and books), participation to conferences and quotations in high standard reviews. Publications include articles in scientific reviews, French and international books, or participation to a book written by several people. As we already said, publications tend to be written just by one person who sign it. So there are few articles signed by three people or more.

International conferences do not attract a lot of researchers in economy. Most of the heads of teams feel it is a waste of time. But they like small international meetings which are used as workshops. However they are aware of the importance of international conferences to make their work known. As they lack the money to send researchers to attend them, they organize by themselves colloquia or "journées" (days) once a-year or several times a-year. About half of the research teams surveyed organize such colloquia.

For publications as well as for participation to conference teams' seniority must be taken into account.

To summarize, research in economy can be described through the following diagram which presents three types of research teams :

FIRST CASE -

C.N.R.S. teams located in University and led by a professor (without any C.N.R.S. researchers)

- . No priority for field of research — researchers interests are scattered
- . vertical structure : many young researchers who have not yet a position and who complete their Doctorat.

SECOND CASE -

C.N.R.S. teams located in University and led by a professor (without any C.N.R.S. researchers)

- . Mostly basic research
- . Group of University's Professors
- . Horizontal structure : researchers and Head of the team have roughly the same scientific level.

THIRD CASE -

C.N.R.S. teams with C.N.R.S. researchers

Mathematic economy

- . very few relationship with general economy
- . Horizontal structure : researchers have the same scientific level and they mostly do research alone

General economy

- . Many grants available
- . Either Horizontal structure :
The head of the team does not have any scientific authority on researchers
- . Or vertical structure :
The head of the team has an administrative authority ; there are several research sub-groups inside the team.

CHAPTER 2 - LINGUISTIC

Sixteen research teams have been surveyed, eleven by face-to-face interviews and five by telephone interviews. Some of the teams do research in ethnolinguistic and have researchers who also belong to the linguistic section of C.N.R.S. or to the ethnology section. In order to avoid this complexe situation, we only include in this section, research teams for which linguistic is the main research field. Various persons, either could not or did not want to be surveyed : one head of team had a long illness-leave, two had a such heavy schedule that they changed three times the appointment until they left to work on the field in Africa. Others refused to participate in the research because they do not have researcher except teaching persons who do research on their spare time and do it alone.

A - THE ORGANIZATIONAL CONDITIONS -

A.1. - The affiliation -

Among the sixteen teams surveyed, nine are ERA (Equipe de recherche associée) ; for the seven remaining all kinds of team structures have been found : two are GR (groupes de recherche), two are UR (Unité de recherche) linked with a main a LP ("own laboratory") which is the Institut de la Langue Française situated in Nancy and includes several relay-teams all over the country. The three other teams are a LP, an ER and a R C P (recherche coopérative sur programme); we did not plan to include RCP teams in our survey but this one is going to become an ERA and as further comments will show, it works like an ERA.

Nine research teams are located in Universities, four in buildings belonging to E.H.E.S.S. (Ecole des Hautes Etudes en Sciences Sociales), two in C.N.R.S. buildings and one has

space in two different places -Ecole Normale Supérieure-Ulm and National Library. So Linguistic research is physically very closed to teaching even when the teams are not located in a University. As to teams heads affiliations, eight are professors, six are top-level researchers and two are Directors of Studies (the uppest level of teaching in E.H.E.S.S.). Every head of team teaches somewhat and most of the C.N.R.S. researchers too. Team's affiliation is shown in table 2 :

C.N.R.S. + University (N=9)	C.N.R.S. + E.H.E.S.S. (4)	C.N.R.S. (3)
Professor (8)	Director of Study (2)	Top level researchers (
Top level researcher (1)	Top level researchers (2)	

TABLE 2 : AFFILIATION OF RESEARCH TEAMS IN LINGUISTIC AND LEADERS' POSITION

A.2. Team's size -

As every research team in linguistic is involved in teaching activities, there are a lot of people affiliated with these teams : they attend seminars, work to complete a Thesis of Doctorate but have no C.N.R.S. position. Some of them are young University assistants, some of them are high-school teachers. They have not been taken into account to rate the team's size for their involvement is irregular.

Team's size goes from seven to fifty. Three teams do not have any C.N.R.S. researcher and among these, one is a RCP team with only professors and teaching- research persons. Another one is a young ERA so it has not yet any researcher and the last one gathers older and very erudite professors but it seems that their field is "out of date" and does not attract any more younger researchers.

Size disparity is high : four research teams have less than 10 people, nine teams have between 10 and 19 people, two teams have twenty and one has fifty people. The last one's history is interesting : the team began in 1966 as a RCP, grouping research workers who studied languages of Africa ; then it became an ER, then a GR and in 1976, a large laboratory covering several geographic areas, in Africa, America and Europe. So this laboratory gradually gathers existing teams in order to get more funding to finance field travel and field equipment. Of course, individual teams joined this laboratory on their own wish, in order to confort and make stronger the team's positions.

Among the twelve research teams who have C.N.R.S. researchers, four teams have less than five researchers, seven have between five and ten C.N.R.S. researchers and one has as much as 40 C.N.R.S. researchers and 10 ITA. As we already said, every head of team has teaching duties and many C.N.R.S. researchers do lectures or courses.

Almost all the research teams have technicians (ITA) ^{are} allowed to use the staff of their university. The foreign researchers usually belong to a team where the language of their native country is studied and they come in order to

complete a Thesis in France. After they got their degree, they go back to their country and go on doing research in connection with the French team.

To summarize, linguistic research teams are ^unusually large and very much involved in teaching activities. Some teams have a lot of non-permanent "researchers" who come very irregularly, this being due to the specificity of their research field. These teams have very narrow fields and are often the only ones in France to do research on their subject.

A.3. - Researchers training -

Every researcher has a basic training in linguistic except (in two cases in the same team) mathematicians with a linguistic training as well. But most of them have a double training, either in Human Sciences, Psychology, Sociology, Ethnology or in modern and classic literature or still in one foreign language. One team has researchers who got a theatrical training but this team is a theatrical research group. So all the researchers in linguistic have been trained in a University.

A.4. - Researchers' age -

Among the sixteen research teams surveyed, six are run by heads who are much older than the members of their team, as they are sixty years old and over. However, in most of the cases, researchers are older than 32 and a 35-years old researcher in linguistic is said usually to be a young research worker. It is interesting to note that the mean age of research workers hired in the linguistic section of the C.N.R.S. is 34 and that most of the present researchers are over 35.

A.5. - Membership's sex -

Three research teams are run by women who are top level C.N.R.S. researchers and younger than most of the other heads who are professors. Among the researchers there are a little more women than men.

A.6. - The teams' seniority -

Six research teams have existed for more than ten years, six between five and ten years and four for five years or less. One must note that some teams have received the C.N.R.S. label recently but before that date they were very active research group in E.H.E.S.S. or in their University. Moreover, some teams created by well known researchers in the field like Germaine TILLON built on their fame for a quick development. So a team's seniority has to be considered taking into account its history since the beginning.

B - THE HEURISTIC PROCESS -

Two types of heuristic processes may be described : ethnolinguistic, and theoretical linguistic, adopt quite different approaches. Ethnolinguistic does not use theoretical hypotheses because they are supposed to narrow the research perspectives but hypotheses are suggested by ^{the} field. Theoretical linguistic looks for a methodology to describe and analyze both spoken and written languages.

B.1. - Ethnolinguistic -

The main characteristic of ethnolinguistic is the geographical delimitation. For instance one team will specialize in the ethnolinguistic of Indian America : it describes languages within this area which have not been studied yet, in connection with the ethnologic context. Another team will

specialize in "Languages and culture of West Africa". Hypotheses are created through both the field work and the data analyses. They emerge simultaneously as data investigation goes ahead. Another team using the same heuristic process is specialized in oral literatures, dialectology and ethnography of the Berber-Arabic area. Some teams have to rescue languages which are just spoken by two thousand people, for instance, the West-Atlantic languages in Africa. Each of these teams is, therefore, highly specialized in a very specific geographical area ; basically they make inventories of unknown languages or describe foreign languages taking into account the social and historical context.

Some larger ethnolinguistic teams which cover geographical areas over different continents give priority to larger subjects such as oral tradition, description of languages and sociolinguistic. After they got their material, hypotheses and comparisons can be made and further research on syntax, phonology and lexicology worked out. In addition, the research done can sometimes give rise to applications in the country where the language is studied, such as the creation of training program to teach writing and reading in country with a very low literacy.

Two other teams in ethnolinguistic have a specific approach since they study ethnolinguistic within a historical frame. One of these teams does research on Italian Renaissance and the other is specialized in Spain of 16th and 17th centuries. Their research material consists of archives and literature of their period and they use also research from contemporary ethnologists. They explain linguistic facts with the help of social, and historical factors. Contrary to the first group of research teams in ethnolinguistic, they do research from given data. But they have the same purpose : to relate linguistic phenomena to social and historical content.

B.2. - The theoretical linguistic -

This type of linguistic research studies the characteristics of language through various languages. For instance one team works on the basic features of languages which they name "invariants" because they cannot be reduced further in order to be classified. Another team does research about phonetic and phonologic typology, and "contrastive" research. It means that they study syntax, phonetics for several languages belonging to the same group, for instance the Finno-ugric languages. Theoretical linguistic works with well defined hypotheses which can be modified by the results ; this will then generate new hypothesis. This type of research uses computer data analysis and one of these teams has three mathematicians research workers. There is a very strong theoretical impact on research ; and it seems that theoretical positions divide researchers working in the same team. Sometimes theoretical conflicts are important because researchers on different theories and use different approaches. le

In conclusion it can be said that the heuristic process is very different for the two sub-fields in linguistic, ethnolinguistic and theoretical linguistic. The first one is basically the description and the explanation of linguistic phenomena ; the second one deals with language regarded as a phenomenon which includes its emission, its reception, and the way it is structured.

C - RESEARCH CHARACTERISTICS -

C.1. - Mono_or_pluridisciplinary_research?

As it has been said about researchers training most of the researchers have a double training including always a basic training in linguistic. Sometimes in ethnolinguistic, researchers have been trained both in linguistic and ethnology

and also in a specific foreign language.

Most of the theoretical linguistic research teams have experts in computer data processing and often also one or several mathematicians. One team specialized in the analysis of manuscripts has a researcher specialized in optics while other researchers have a linguistic, or history or modern literature training.

C.2. - Individual or group research?

Linguistic research seems to be both a collective venture and a research carried out by individuals on their own. In teams whose research field is defined according to a geographical or a historical area, researchers study one specific language or a specific subject within a common area. So information from other researchers involved in the same area but working on different topics is very useful, if they study another language or even if they study a quite different phenomena like, for instance, food habits or family structure. One can say that some concerns are common to all the group while each researcher has a specific subject and does work in a solitary way.

In theoretical linguistic, research is more radically individualistic. Within the same team, people will learn on different theories and use different methodologies. The only common feature is their purpose : the scientific approach of language structure.

C.3. - Basic research or grant research -

Grants are very unusual in linguistic. Some teams receive grants from C.N.R.S. within a specific program, for instance "Automatic Phonetisation" with applications to telematic and robotic. Generally very few teams are eligible to enter a

program because few people are specialized in the field it covers.

Actually, research is restricted to people with an academic position in C.N.R.S. or in University. Linguistic research is only beginning, which means that each team has to build its own corpus, its own methodology and are just starting a long-term research. Moreover linguistic is not a popular subject and needs for linguistic research are not priorities. Two teams *doing* research on "theatrology" on the one hand and on "contemporary literary lexicology and terminology" on the other hand have very non-traditional approaches and are considered as avant-garde research fields.

C.4. - Given data or built data -

All types of data can be found. In ethnolinguistic some teams have to build entirely their data : they use field surveys, records of oral tradition, as sometimes languages are spoken but not written. They have to create an alphabet. Some teams use both field surveys and manuscripts or archives. Theoretical linguistic does not need to do field surveys ; basically it studies a corpus which is their raw material -and this corpus is built from a well-known language. In fact ethnolinguistic and theoretical linguistic do not work at the same level of research : the first one consists of description of inventories and dictionaries, the second one consists of the analysis of language structure including syntax and phonetics.

To summarize, linguistic is a new research field. Therefore, many research teams try to describe quite unknown languages, other study the development of languages at a given time in relation to social context, and other study methodology which could be applied to analyze other human sciences or other languages, regarding language as a scientific fact.

D - THE TEAM'S MANAGEMENT -

D.1. - Meetings' frequency -

Half of the teams have regular meetings : for most of them, once a month. They are scientific meetings -researchers talk about their research, then discussion and criticism follow - and sometimes financial, in order to set the budget used to go and work on the field. Two Teams have meetings where the head does not attend : he gets information later from a researcher responsible for the meeting and its coordination.

The structure Thus created can be very loose and raise problems. For exemple, the head of one team who should ask C.N.R.S. renewal of his team's position does not intend to do so because he feels the present team to be too heterogenous and he does not agree with the research perspectives taken by some researchers.

Other teams have several meetings a-year ; and for the big ones, the different groups of research inside each team have their own scientific meetings.

In addition to these meetings, every research team has seminars for students who do their Doctorate with the team's head and also for other people who work on the same subject as the team, such as assistants coming from other universities or teachers from high-school whose job is related to the team's research.

Meetings in linguistics are a large part of the team's life ; they are specially important in teams who write dictionaries between French ^{and a} Foreign language still unknown, where a collective work sessions have to be organized regularly.

D.2. - Are researchers controlled?

Heads of laboratories are very well informed about researcher's progress and the meetings seem to be a efficient way to follow researchers work. This control is more a coordination of group-research than a check of the researchers' work. Two factors seem very important to explain the linguistics research teams cohesion : (1) they are highly involved in teaching ; some of them are the only one in France to teach a specific subject. This strengthens the researcher's feeling to belong to a group, and their level of involvement ; (2) linguistic is not a field of research very well known ; there are few contracts and grants, and this prevents teams to have scattered interests. So they focus on a topic of research, and develop it.

D.3. - Competition -

There is a consensus among research teams' heads to say that there is no scientific competition between researchers because research subjects are very specific and each one has its own research. So very well-defined research subjects seem to avoid competition between researchers. But competition does exist when several researchers of the same team apply for promotion inside C.N.R.S. This institutional competition is likely to give rise to scientific competition.

D.4. - Team's productivity -

As teams are very specialized, many of them have their own "series of books" and regularly publish a volume - some of them publish a quarterly review and this also seems to be a good mean to strengthen group's ties.

Many of the "oldest" teams organize by themselves conferences lasting one or several days, on a national or international scale. They do not go often to international

conferences abroad because they do not receive enough financial support. Furthermore, team's productivity has to be considered taking into account team's seniority and then, its membership. Productivity evaluated by the number of articles is low for young teams which have just teaching-researchers whose main concern is to complete their "Doctorat d'Etat". While C.N.R.S. researchers in order to get promotion are rated on the basis of their publications and ^{are therefore} more stimulated to publish.

To sum up, three comments have to be made : (1) Linguistic is a new science and ^{most} of its research topics are at the very first stage of research. It means also that linguistic is still defining its field and its limits. (2) Scientific approaches are very different : ^{and on one hand,} for ethnolinguistics, hypotheses are regarded as reducing the research perspectives ; field always has ^a priority and researchers have to be very open to it. So research is basically description and investigation to get material. ^{And on the other hand,} Theoretical linguistic uses theoretical framework and hypotheses to study language as a phenomenon which ^{obeys} strict rules. It tries also to build a unique methodology which could be used to analyze languages content, such as, political, advertising, social sciences languages. (3) Research teams are highly structured and have a strong cohesion ; this can be explained by three factors :
(a) many of the teams are the only one expert in their field in France or ^{even} in Europe.
(b) as a consequence they are involved in a lot of teaching activities
(c) many of them publish their own review or are editors of "series" publishing one or several books each year.

CHAPTER 3 - ETHNOLOGY

Nineteen research teams have been contacted. Several other refused to participate because they ~~are~~ loose groups ; their head said he has nothing to say except there were a few meetings each year, researchers keeping in touch together mainly by mail. Five heads could not be surveyed : three were working abroad, doing field researchs ; two of them, very well known, have very efficient gatekeepers who made the appointments impossible during four months. Among the research teams actually surveyed, seven were interviewed by telephone, twelve by face-to-face interviews.

A - THE ORGANIZATIONAL CONDITIONS -

A.1. - Affiliation -

Among the nineteen teams, nine are C.N.R.S. laboratories, six are "associate laboratories" and three "own" laboratories ; one is an ERA (associate research unit) which belongs to the Institute of Art and Archaeology.

Most of these teams are also affiliated with other research organizations. One has even three affiliations : C.N.R.S., E.H.E.S.S. and Collège de France, five have two affiliations (C.N.R.S. and Musée de l'Homme), four have two affiliations (E.H.E.S.S. ^{and C.N.R.S.} and two are affiliated both to University and C.N.R.S. Moreover every head of team teaches

at least in one University. Some teams have offices in several different places in Paris ^{در باريس} Collège de France and E.H.E.S.S., and the biggest one is creating a second unit in South of France. Every team affiliated to a Museum (Musée de l'Homme or Musée des Antiquités Nationales or Musée National des Arts et Traditions Populaires) has space in the Museum buildings. Two teams only are situated in Universities, four in E.H.E.S.S. buildings and the other ones are located in Museums or shared into several locations.

As to head's affiliation, seven are University or College de France professors, four are Directors of Study (E.H.E.S.S.), eight are top-level C.N.R.S. researchers, one is "conservateur", the highest position in Museum.

Research teams affiliation is summarized in table 3 :

MUSEUM + CNRS (5)	UNIVERSITY + CNRS (4)	(COLLEGE DE FRANCE) EHESS + CNRS (5)	INST. OF ART & ARCHAEOLOGY (5) or CNRS
Professor (2)	Professor (3)	Professor (1)	Top-level re- searcher (5)
Top-level re- searcher (2)	Top-level re- searcher (1)	Top-level re- searcher (1)	
"conservateur (1)		Director of Studies (3)	

TABLE 3 : AFFILIATION OF RESEARCH TEAMS IN ETHNOLOGY AND
LEADERS' POSITIONS

A.2. - Team's size -

Research teams in ethnology are fairly large : two have fifty and fifty nine people, two are between 30 and 40, three are between 20 and 30, four are between ten and twenty and only two are less than ten. Irregular members have not been taken into account even *though* researchers belonging to other research teams or to different fields work on a specific research with the teams surveyed. In addition, all these teams are very active teaching units. Many professors and research workers are related to these teams even if they do not have a strict connection with them.

All these teams have C.N.R.S. researchers. Their number goes from three to twenty six : six teams have less than ten researchers, four have between ten and twenty *and 3 have more than* ~~not have and~~ ^{teaching} person, and it is specialized in archeology. Four teams do not have any ITA (technician) but some of them have technicians who belong to other organizations such as Museums. It has to be noted that Musées de France have their "own membership" "conservateurs" and technicians. For instance, one team has ten ITA who are affiliated to Musées de France and whose main activity is to deal with archives. There are very few foreign researchers but some foreign professors keep regular contacts with the teams.

Some remarks have to be made about the biggest teams. Two ~~have~~ more than fifty people ; one of them took its start in 1940 and became really active immediately after the Second World War. It is really the heart of French ethnology, with affiliation to both C.N.R.S. and Musées de France. The other one started in 1962, twenty years ago, as a RCP with seminars for students doing their dissertation. We must therefore underline the fact that the biggest teams are the oldest and were active in research and in teaching even before they obtain^{ed} affiliation with the C.N.R.S.

To summarize, research teams in ethnology are big and most of them are the only teams in France specialized in their research field. So they are very involved in teaching activities and every research worker interested in this field has some kind of affiliation with them.

A.3. - Researchers training -

Research workers in ethnology have all kind of previous trainings. All the teams' heads agree that the best training is the thesis for Doctorate of 3ème cycle for which future researchers have to achieve a field research. Most of them have learned at least one other language. Some of them have a double training-for instance history and ethnology or economy and ethnology - and apply it to the geographic area in which they specialized. Some teams have physicians or specialists of natural sciences, of statistics, of anthropology, sociology or psychology. Other teams have specialists of history, philosophy, music, linguistic and art history. Researchers' training in archaeology is more focused in archaeology and history. Most of the researchers got their training from E.H.E.S.S. and University.

A.4. - Researchers' age -

Researchers and heads' age can be classified under three categories : (1) the team's head is near retirement and the researchers' ages range between 35-40 to 60 ;

(2) the team's head is young (around 40-45), ^{he} has been recently appointed and researchers of all ages are to be found in his/her team ;

(3) the team's head is young (about 45) and most of the researchers are younger (under 40). In that case the team is usually young also ^{having} been created in the last five years.

A.5. - Membership sex -

Among the nineteen teams surveyed, three are run by a woman. In teams where archaeology is prevalent, research workers^{etc} more often men than women ; in the other ones, there is no rule, some of them have more women, some of them have more men. But this breakdown does not result from a conscious choice. All the heads of teams interviewed agree to say that sex is never a criterion when hiring a new research worker. Furthermore, in ethnology husband and wife often do research on the same geographic area with different research subjects.

A.6. - The team's seniority -

The oldest teams are 40 years old, and started as teams affiliated to Musées de France, then became RCP, ERA and LA or LP. Some teams are ten or fifteen years old and others are less than ten years. The youngest started in 1973 as a research team affiliated to E.H.E.S.S. and got affiliation with C.N.R.S. very recently.

To summarize, most of the research teams in ethnology are "mature" and big. Teams which started 20 or 40 years ago grew and did not divide ^{themselves} into several small ones. It can be assumed that this organizational structure fits their specificity and the high specialization in one geographic area. Training in ethnology is time consuming since researchers are required to handle field research and get an additional training in linguistic. So heads of teams agree to say that a 35 years old researcher is a "young" one.

B - THE HEURISTIC PROCESS -

The main characteristic of the heuristic process in ethnology research is the researcher's personal involvement in his (her) field. The success of the research is determined, first of all by the researcher's ability to make himself (herself) accepted by the people whom he (she) studied.

The very great importance of field work decreases the relative interest given to theoretical models and hypotheses. A new research begins with a list of questions but without any well-defined hypotheses. Most of the time researchers have as a main aim, which is to explore a geographical areas yet unstudied.

Usually, each team is specialized in a specific geographical area; however some of them do research in several areas such as Africa, North of South America, West Indies... In that case they usually study one topic in different locations in order to compare data. This is the case of the "oldest" teams who started with one area, and, as they grew, extended their methodology to new ones. The theoretical ~~paradigm~~ used seems limited to the application of concepts developed in previous research. Ethnology which is considered as a new science, has to build a theoretical language common to ethnologists. For the present times all of them use the same methodology which is an active observation. All the heads we interviewed strongly emphasized the importance of a good involvement in his (her) field for the researcher to be successful. This obviously means not only acceptance by the autochtones but also an insight in their culture.

Why do researchers ~~limit~~ themselves to one or two fields ? Most of the heads ~~did~~ say that all their researchers

study one field and spend a life time on it. However some of them think it is better to work on two border-line fields so that each one helps to study the other through comparisons.

The teams' heads also point out the importance of personal and intellectual qualities : researchers have to be quite available and very open-minded towards their field and not be too much oriented by their training. They emphasized also the fact that researchers are alone "in the field" for long periods and have to be able to cope with this loneliness.

To summarize, in ethnology, "field" is a concept always prevalent and ethnologists have to be devoted to it. Research is organized according to geographical delimitation but also to themes and subjects, which are studied simultaneously in several areas. Finally it can be said that ethnology is much more concerned by a qualitative approach than by a quantitative one. One can't help feeling that approaching a field of research with a prefigured hypothesis is considered as a prejudice destroying the ability to understand the field characteristics.

C - RESEARCH CHARACTERISTICS -

C.1. Mono_or_pluridisciplinary_research -

Research teams in ethnology gather researchers who in addition to ethnology are trained in different disciplines. So teams have specialists in history, geography, medicine, sociology, botany, music and so forth. It seems that ethnology is by itself a "multidisciplinary" discipline. Statistics are not very much used except in one team doing anthropology

research ~~where~~ the head requires that researchers handle statistics. It is ~~True~~ that, contrary to most of the teams, they study large samples.

C.2. - Individual or group research -

Researchers are alone "in their field" and as it has been said, it is their personal involvement which makes the research successful. Heads of laboratory agree to say that several researchers working together at the same time in the same field never do "good" research. But some of them said that several researchers in succession with different perspectives of research in the same field is a very productive approach : each researcher studies "the field" from its own point of reference and the different results ~~fit~~ with one another. The only condition is that different researchers must not be "in the field" at the same time. Researchers have to be alone in the field ; yet, when they come back, they do need to meet with colleagues and talk about their research, present the results and submit them to criticizing. So meetings and discussion inside the team ~~fill~~ one need : to help the research workers to take distance from their field and to structure their material.

C.3. - Basic research or grant research?

Grants are very unusual in ethnology and as it has been said already, researchers study the same field during all their life. It is very unusual that a researcher works in two fields situated in two different continents. Field drives research and the way it grows. Therefore, the main problem for research teams in ethnology is to get support for travel and stay "in the field" as researchers very often have ~~to~~ remain there for 2-3 months at a time.

C.4. Given data of built data?

Ethnologists build their own data ; ^{here,} again, the researcher's personal involvement is very important. Information they are able to pick will be determined by the way they are accepted by the group and they manage to be integrated in it. Some research is done on archives, but most of the time research workers use "natives" (called "informateurs") who help them not only to understand the dialects but also to get introduced to the people they study. The length of stay in the field is function of many factors : first, of course, the support that the researcher ~~got~~ ; secondly, the country : 6-12 months may be required in an "exotic" field ; when two months in a region of France are enough for French researchers. However, some heads of laboratories think that researchers have to stay, ~~for~~ their first trip, at least ten months in the field, for the study to be fruitful.

In conclusion, researcher's personal involvement and relationship to the field has to be emphasized as a key-point. The quality and success of research is determined by the quality of the researcher's relation with the field. Researchers work by themselves in the field since they have their own field and until now respect of each researcher's field has been an unformal but well respected rule.

D - THE TEAM'S MANAGEMENT -

D.1. - Meetings frequency -

Research teams do not have regular meetings and the main reason is that researchers are often away, so regular meetings would not make sense. The biggest teams have twice a-year

a large board meeting which aim is to allocate supports for field trip. Besides they have usually a scientific meeting at the beginning of the University-year (October) to define research areas and present current research projects.

Inside the biggest teams, some smaller groups organize their own meetings, sometimes as often as once a month. In several laboratories after ~~having~~ tried to organize regular meetings, it was decided to give them up because it was felt that unformal meetings were more effective.

In addition, most of the teams have teaching seminars which are really research seminars attended by students who study for their "Doctorat de 3^e cycle" as well as by researchers. Those seminars usually meet once every two weeks between October and May. They are important because all researchers know that if they need to meet with the team's head, they can see him (her) before or after the seminar.

D.2. - Are researchers controlled?

The very well defined delimitation of researchers' fields makes very difficult any control from the team's heads. Most of the heads said it is not ~~their~~ duty to control the researchers' work after they ^{have} completed their Doctorat de 3^e cycle. Sometimes they advise them about field problems, but they never impose their opinions against an orientation chosen by a researcher. All of them agree that there is a very personal link between a researcher and his field, so that nobody, except the researcher himself (herself), is able to assess his (her) work.

D.3. - Competition -

Competition does not exist at all between researchers in ethnology since each has his own field. There is of course an institutional competition when several researchers, belonging to the same team, apply for promotion in C.N.R.S., but most of the researchers have an academic position and do not need to get this type of promotion.

D.4. - The team's productivity -

The biggest and "oldest" teams publish their own review or "series" or "bulletin". They also publish books with several authors. Most of the heads interviewed felt that International Conferences have no scientific interest. They do attend in order to make their work known but they prefer small meetings and colloquia where only specialists of a field meet together. Most of the publications - articles, papers - are signed by one person, the researcher himself.

To summarize, research teams in ethnology are big, but it does not mean that researchers work together. Teams gather individual researchers who work in their own field and do not intrude into other's fields. Researcher's personal involvement is the main characteristic and requirement in ethnology. A head's comment can help to understand integration of individual researchers to a team : "The research team has to allow researchers to take distance from their own field through experiences, work and results of their colleagues. Team work is therefore a necessity, not as a basis for collective work, but as a social structure where everybody exchanges colleagues' attention and interest for his work against his own able interest to all the others' work."

In the first research (on bio-medical laboratories), we observed a significant correlation between the four success criteria collected during the survey :

- Invitation to Colloquium and seminars
- Participation to Congress
- Published work
- Quotation by peers

This made it possible for us to classify all the laboratories into five categories, going from the very best to the very poor level, without a risk of important mistakes.

The situation is quite different in the present survey. First of all, we have seen how difficult it is for members of research laboratories to find funding for the travel cost in order to attend international conferences. Taking into account the present economic circumstances, money is more and more restricted to cover the expenses of well known people in the field. It is true that some scholars try to pay for such trip on their own resources, planning their holidays in the country where the conference is taking place. This is not possible for the young researchers who often have low salaries and young children. Without going into more details, it is obvious that participation to conferences and congresses cannot be considered as a reliable index of the laboratory success and achievement.

Quotations by peers are no better. Most of the laboratories surveyed are active in a very narrow field. So, when asked to name the best French laboratory in the same field, they cannot reply. If they are asked to name a laboratory in a related field they tend usually to choose a team working on the same topic within a different frame of reference. For instance, the head of a research laboratory specialized in linguistic studies for the Latin American countries will know a lot about the activities of economists, geographers, sociologists active in the same country, but not much about the work of linguists studying west Indian or central African languages. As a result, they will understand "related field" in a broad way and the laboratory quoted will actually be outside the domain of linguistic itself. This fact must be remembered as it shows how coarse is our classification of social sciences and how far it is from the real network of interests and activities.

A third possibility had to be discarded as well. Colloquiums and seminars are usually events organized on a small scale and restricted to well known and active scholars. Invitations to attend such meetings may be considered as a success criteria and they were strongly correlated with the other criteria in the bio-medical field. The situation is quite different here. Because there are no private sponsors (such as pharmacy companies) to support such meetings, they have to be funded by public bodies or by foundations.

Therefore the frequency of these events is much lower than in the medical field. For instance, in one year, for one field, it is quite possible that not a single symposium will be organized. The question about how many research workers in a team attend such meetings each year is, consequently, meaningless. Moreover, we have seen that work in linguistic and in ethnology has to be done "on the field", which means that priority would be given to field trip over research meetings.

We are now left with only one type of success criteria, -the amount of published work. We tried to check this criteria with great care. First, we asked the sponsoring organization of each laboratory (CNRS, EHSS, University, INSEE....) for a list of publications, for each laboratory, and for the last three years. The list was then classified into books, papers and mimeographed reports. In order to have a figure, as objective as possible, we decided to give each laboratory 3 points for a book having more than 100 pages, 2 points for a slimmer book or monography, 1 point for a paper. We dismissed one or two pages notes, and mimeographed reports. Also we checked the list of Reviews and kept in our figures only Reviews having a clear referee policy and being explicitly accepted as "scientific publications" by the committee of the National Scientific Research Center in each of the field considered.

The total number of points was then divided by three, in order to get a yearly mean for each laboratory. This mean was again divided by the

number of permanent research workers so as to obtain a yearly mean of publications per head. The result goes from 1.8 to 2.9, showing rather limited variations between teams (standard deviation = .4). If we look carefully at the data, different characteristics in the rythm of publications explain this fact. First, research workers may spend a certain time writing a book or preparing their thesis, or even working on the field to gather data. During that time, they will not publish papers. Secondly, the concept of "article" or "paper" remains very loose, even with the limitations we described. It can be a fairly long and elaborated paper with description of facts and data which took several years to gather and process. It can be, as well, a review of the literature on a specific topic or a short note describing a piece of research. Also, when a review publishes a special issue, well known researchers are asked papers which can be remakes of previous work. All in all, adding all these items cannot lead to a reliable index.

This is why in order to try and get a better picture of the scientific production achieved by each team, we studied the possibility of another index based not on published work but on quotations in published work. A test of this index was made for the field of linguistics. We took the list of Reviews previously used and content analyzed five years of publications, looking for quotations by colleagues of each team's

researchers names or printed work. This is a very tedious and time consuming work as the list of names to look for nearly reached 300 and 22 reviews (French and foreign) were analyzed, -which means around 50 000 printed pages. Figures for each laboratory were processed with the rationale used previously for the amount of published work : a mean per year and per head was calculated as a quotation index for each of the 16 teams.

Figures describing the quotation index are between .4 and 6.4 (mean per head and per year) with a stand and deviation reaching 2.1. Quotation number are fairly different from one year to another. When one looks at the data in details, it is clear that a key paper may have a strong impact on the field and be very often quoted during two years, raising the team's mean for these two years. Also, a textbook, or a new methodology giving technical descriptions, or even describing the state of the art on a specific topic will be heavily quoted for a while until new developments make it obsolescent.

All these comments explain that the correlation between the two index ⁽¹⁾ (quotation index and publication index) is low (.18), which does not suggest the possibility to aggregate these index as we were able to do in the bio-medical field.

The effort to build a reliable aggregate index of productivity in the social sciences, and an index which could be used in different domains (as we did in the bio-medical field) did not lead us to satisfac-

(1) Calculated only for the linguistic laboratories

tory results. This failure, as well as the heterogeneity of the different research processes, outcomes, and of the social structure of the team will be discussed in the conclusion.

IV CONCLUSIONS

CONCLUSIONS

The aim of the present research (following the results of a first "research on bio-medical research") was to explore the possibility of applying to social sciences the four conclusions reached in the bio medical field :

(1) The style of leadership is a powerful determinant of the team's success. A participation climate associated with a high level of structure in research planning and control within the team is to be found in the best laboratories. When "no participation and no structure" is the rule, a lack of consideration for the researchers' professional and personal problems make things worse.

(2) Various heuristic processes are to be found in the different subfields of the bio-medical research.

(3) The heuristic process is one of the determinants of the social characteristics of the team, of its cohesion, and of the nature of the leadership behaviour.

(4) Other determinants of the social characteristics of the team are a) its size and b) the heterogeneity of the staff member's training and present status.

We shall now take each of these four points

and see how they apply to the social sciences.

(1) Style of leadership and research success

As we have seen in the last part of the present report, it has proved impossible to build a productivity criteria in the social sciences, reliable enough to compare against its different levels various leadership styles.

A few comments about the meaning of such an index seems appropriate here. First, it must be considered as a "sine qua non" condition of success in research. Without visibility, research outcomes have no value, and no chance whatsoever to reach the stage of practical application : publication, participation to Colloquium and conferences are the main ways to disseminate knowledge about a team's outcomes and open them to other kin of "reality test".

This is true as well for the bio-medical field as for the social sciences. But the situation is, after the publication stage, very different in these two research activities. In the bio-medical field, "practical" value could be evaluated in a follow up studies of the published results in order to answer questions like : did the research results open a new path towards a chemical entity useful in therapy ? Did it help building new tools for diagnosis ? Did it show how to organize a prevention campaign ? Did it lead to a new semiologic classification useful in practical medicine ? All these questions have in common a general frame of reference which is the

improvement or restoration of people's health and well being.

Social sciences do not have such a clear common purpose against which the usefulness of a piece of research can be evaluated. It does not mean that social sciences cannot have a practical usefulness but that research in social sciences can be evaluated with a short time range against a specific aim or against a large time range with the general purpose of knowledge development.

This very quick analysis leads to a problem which we already approached in our content analysis of a funding committee functioning ⁽¹⁾. How do evaluations reach a judgement ? What is the weight of short-time and longtime usefulness ? What is the relative weight of :

a) evaluation of a proposed research chance of success and of

b) the applicability of results to a specific problem ? Is there in the evaluation, some crosscomparison of input and output in financial terms ? The same type of problems could be raised within the laboratory : which kind of factors determines the decision to follow a line of research, to enter a new field or to give up ? What is the weight of priorities as explicit by the research agencies ? of the researchers' own interest ? of the laboratory equipment ? of the researchers previous knowledge ?

(1) G. Moser, C. Levy-Leboyer, Le Dialogue Décideurs-Chercheurs en Matière d'Environnement, DGRST, 1980

Very little research has been done so far to describe the decision dynamics of the research choices. A survey among key deciders in different countries could be a difficult but not impossible task and certainly worth while as it would show the social process of decision and stress the neglected factors in decision taking.

(2) Various heuristic processes have indeed been found in the social sciences. Actually, it is amazing to see how different is the creative process in fields which, for the outsider, seem to be close to one another. Three factors are responsible for these differences :

a- the field maturity, -and the fact that researchers can use a large number of abstract concept (economy) or have to build new concepts to progress (linguistics).

b- the importance of data gathering which may be not time consuming when data are borrowed from other (economy) or which represent the main case of the research work (ethnology). In the last case, the personal ability to adapt to life on the field is a "must" for the researchers.

c- the level of involvement in present day social events : they are ^atest against which research models and results have to be checked (economy) while research without this possibility lean on colleague's evaluation in regular meetings to receive a feedback on their work.

Therefore, one cannot speak of ability to do research in the social sciences. The requisites are deeply different in the various fields. Here again, it would be very useful to have a job analysis done for research workers in the different fields. How long do they spend gathering or building data ? How are these data processed ? How are results presented and discussed ? The three cases analyzed in details here show clearly that the management of research should take into consideration a job analysis description of each research activities workload.

(3) and (4) Leadership styles - The role of the heuristic process is obvious when one compares the three fields but not in the way we expect . Let us first look at the social cohesion of the teams. In domains where field research is a rule, such as ethnology, the teams are very loose. Scientific meetings are both unformal and scanty ; researchers meet when they can and wish. In ethnolinguistic where the geographical field is less important and plays the role of a work frame, researchers who refer to a common area share the same theoretical concepts : research groups are then more important. However, in mathematical economy where each research worker deals with a specific topic, autonomy is great and meetings are only unformal. To summarize, specificity of research, field dependency foster loose team, while common research areas, existence of long-term research stronger cohesion.

The leadership style is influenced by three factors. First, research activities is not determined by access to technical assistance and equipment (as it is the case in bio-medical research) ; however it has also financial aspects through travel money allocation. This is where the leader has power over the researchers in his team. Secondly, there is no real group activities, -at most the laboratory is a place to listen and be listened to. Third point, when the laboratory accepts grants and undertake funded projects, the leader must have an authority on decision and on the research program.

Thus the leader style is strongly influenced by the nature of the research and the degree of group cohesion. But not by the heterogeneity of the staff (as it was the case in the bio-medical research). This show once more that leader have little freedom to adopt a behaviour coherent with their own set of values or with their idea of efficiency. Here, if not the heuristic process itself, the content of the researchers' activities is a limit to the authority a leader could choose to have.

INTERVIEW GUIDELINE

- 1) Definition of the domain of research. What are the main activities of your research team? How do you determine your themes of research?
- 2) Which type of data do you use in your research? Given data or built by researchers? Quantitative or qualitative? When you start a research do you state theoretical hypotheses or do you have just a theoretical framework? Does a feedback from the field happen to change these hypotheses?
- 3) Could you define the methodology the research team employs?
- 4) What is the mean time between a starting research and the first results?
- 5) Are researchers personally involved in the scientific process?
- 6) Has your team been involved in international research programs?
- 7) What is the team's size? Could you describe its membership : researchers, technicians, teaching researchers, non-permanent researchers? What is the proportion of women? the researchers' age? How long have your researchers been working with you? What is the researchers' training? How are researches divided among team's membership? Does your team receive foreign researchers?
- 8) How long has your team been existing?
- 9) Are there team meetings? What is their purpose? How many times do they take place? Do you think they are very useful?
- 10) Which possibilities have your researchers to meet you?
- 11) How do you control researchers' work? through oral or written reports?
- 12) Do you think there is solidarity between researchers? and competition?
- 13) Is the team's repute a factor of satisfaction for researchers?
- 14) Are there inside the team, different research groups or groups which constitute just for one research? Are there solitary researchers?
- 15) Does your team happen to collaborate with another research team?
- 16) How many publications - articles, books, papers at conferences- did your team issue in the last two years? Are publications signed by several people?
- 17) Participation to Conferences. Who goes to conferences and how many times a-year? Do you participate to International Conferences or smaller meetings where there is just a group of experts?
- 18) What requirements do you think researchers must fit to work in your team?
- 19) Could you indicate which proportion of "good" researchers you have in your team?
- 20) What is your main concern for the future?

ANNEX II : List of teams surveyed

TEAMS HEADS SURVEYED IN ECONOMY

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